

# **SPACE SCIENCE UPDATE**

## **MU-SPIN 10TH Anniversary Users' Conference**

**Atlanta, Georgia**

**September 13, 2000**

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# ***The Space Science Enterprise Mission***

**Solve Mysteries of the Universe**

**Explore the Solar System**

**Discover Planets Around Other Stars**

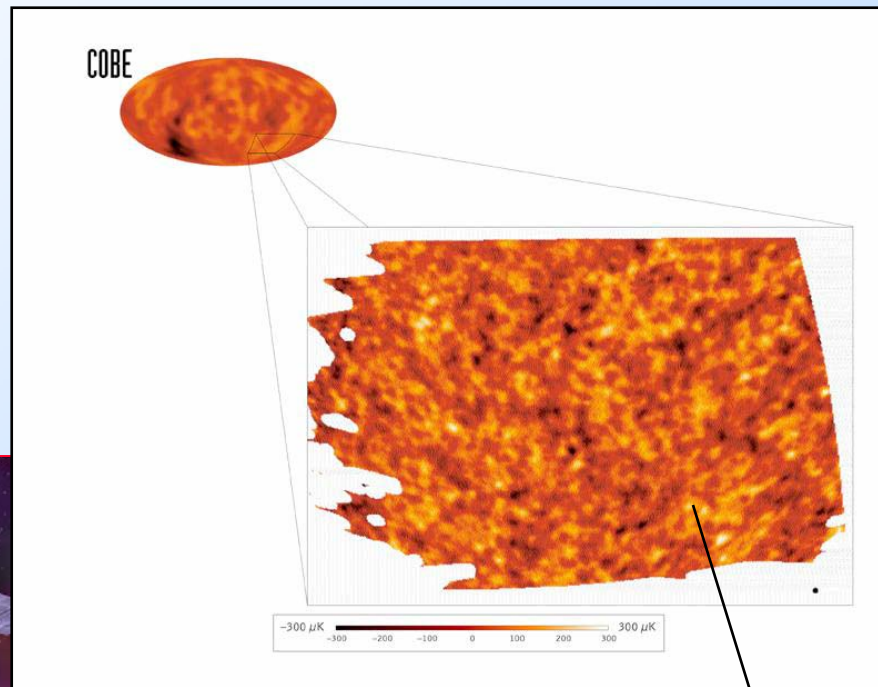
**Search for Life Beyond Earth**

# Structure and Evolution of the Universe

*What is the nature of the Universe?  
How did it come into being?  
How does it work?*

## Current Missions

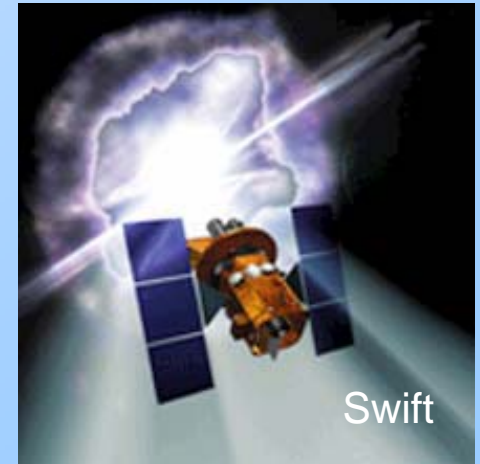
Chandra  
XMM  
Rossi XTE  
SWAS  
EUVE  
HALCA/VLBI  
ASCA  
ACE



Sound waves in the embryonic Universe,  
revealed by the BOOMERANG balloon-  
borne telescope

## Future Missions

GP-B  
HETE-II  
SWIFT  
FIRST  
GLAST  
Integral  
MAP  
GALEX  
CATSAT  
CHIPS  
Planck



# ***Astronomical Search for Origins***

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***How did galaxies first form?***

***Are there worlds around other stars?***

***How did life on Earth arise?***

***Did life arise elsewhere in the Universe and does it exist today?***

## **Current Missions**

**HST**

**Keck Observatory**

**FUSE**



**HST**



## **Future Missions**

**SIRTF**

**SOFIA**

**FAME**

**NGST**

**ST-3**

**SIM**

**TPF**



**SIM**

# Solar System Exploration

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*How did the Sun, Earth and planets form and evolve?*

*Did life arise elsewhere in the solar systems?*

*What is the future habitability of Earth and other planets?*

## Current Missions

Galileo

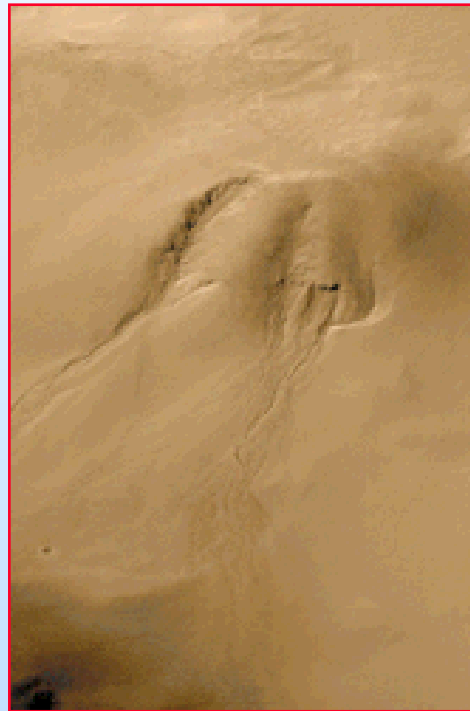
Cassini

Voyager

Mars Global Surveyor

NEAR

Stardust



Gullies eroded into the wall of  
a meteor impact crater in  
Noachis Terra

## Future Missions

Mars 2003 Landers

Genesis

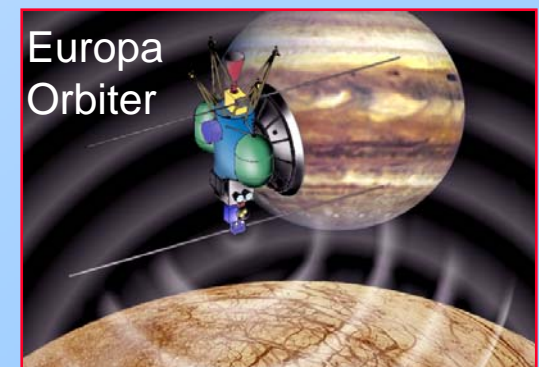
Europa Orbiter

Pluto-Kuiper Express

CONTOUR

Deep Impact

MESSENGER



# Sun-Earth Connection

*What causes solar variability?*

*How does solar variability affect the Earth and other planets?*

*How does solar variability affect life and society?*

*How does the Sun interact with the Interstellar Medium?*

## Current Missions

IMAGE

ISTP

Yohkoh

Ulysses

TRACE

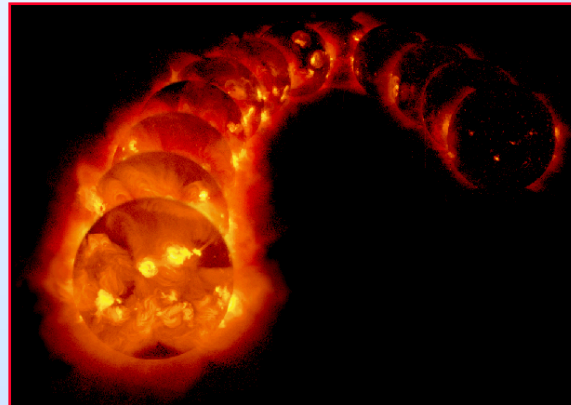
ACE

SOHO

FAST

Voyager

Cluster-II



## Future Missions:

TIMED

HESSI

IMEX

Solar B

Solar Probe

STEREO

TWINS

*Living With a Star*





## **Office of Space Science Education and Public Outreach**

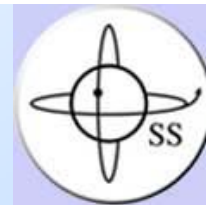


# Goals

- Share the excitement of discoveries and knowledge generated by Space Science missions and research programs with the public.
- Use our missions, research programs, and the human resources of the Space Science community to enhance the quality of American science, mathematics, and technology education, particularly at the pre-college level.
- Contribute to the creation of the talented scientific and technical workforce needed for the 21st century.



# Office of Space Science Education and Public Outreach



## The Strategy

- ▶ **Embed education and outreach in all missions and research programs**
  - Involve scientists
- ▶ **Amplify individual efforts through high leverage**
  - Build upon existing institutions' education/outreach efforts
- ▶ **Involve underserved/underutilized groups**
- ▶ **Evaluate effort for quality, impact, effectiveness**



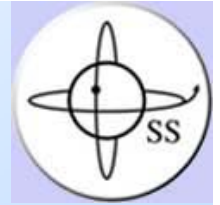
**Educators will fly onboard SOFIA to participate in the scientific research experience.**

## Accomplishments

- ▶ **All OSS missions have required, funded programs and dozens of smaller activities are underway.**
- ▶ **Education Forum Activities**
  - Coordinating mission education/outreach programs
  - Created EPO Resource Directory/ debut Fall 2000
  - Developing web-based resources for informal science institutions
- ▶ **Broker/Facilitator Activities**
  - Connections with education/outreach organizations
  - Regional pilot programs
  - "Match-making", partnership and proposal support
- ▶ **Coordinated presence at education conferences**
  - NSTA, NCTM, ASTC, AISES, ITEA, etc.
- ▶ **OSS is working with science museums, planetariums, and public television ~ 30 shows and exhibits underway**
  - *Passport to Knowledge - Live From...* TV series
  - HST, Mars, and *Electric Space* traveling exhibits
  - Solar System Scale Model on the National Mall
- ▶ **OSS/OEOP Minority University Initiative**
  - NRA Released in Winter 2000
  - 60 proposals received
  - 15 proposals selected for funding



## **Office of Space Science Education and Public Outreach**



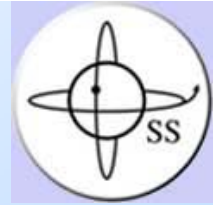
# **Space Science Involvement - Research**

- **Participation in AO's and NRA's**
  - Announcements of Opportunity (AO's) - flight projects
  - NASA Research Announcements (NRA's) - research
- **Direct participation as PI's, Co-I's, or collaborators is strongly encouraged:**
  - MI participation is explicitly called for in most AO's.
- **Current MI participation includes**
  - Tennessee State: ground-based observations for SWIFT
  - UPR Mayagüez: ground-station for FUSE
  - Fisk: detector materials for SWIFT
  - Hampton: Lead institution for AIM (SMEX study selection)

<http://spacescience.nasa.gov/>



## **Office of Space Science Education and Public Outreach**



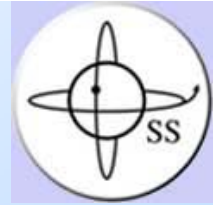
# **Space Science Involvement - E/PO**

- **E/PO funding through missions and research programs.**
  - 1-2% of mission/research funding is devoted to E/PO, providing the major source of OSS E/PO activities.
  - Partnerships and collaborations encouraged.
  - MI's may play a vital role in bringing expertise in minority student programs to mission/research program E/PO activities.
- **Build relations with the OSS Education Support Network**
  - Forums
  - Broker-Facilitators (or become a Broker-Facilitator!)

<http://spacescience.nasa.gov/>



## **Office of Space Science Education and Public Outreach**



# **Space Science Involvement - IDEAS**

- **Initiative to Develop Education through Astronomy and Space Science (IDEAS)**
  - **Start-up funding for innovative education projects that feature collaboration between astronomers/space scientists and education professionals**
  - **Administered by Space Telescope Science Institute**
  - **Funding:**
    - **Up to \$10,000 for small projects that are expected to be completed within one year; OR**
    - **Up to \$40,000 for large projects that are provided a two-year funding period, if needed.**
  - **Deadline Friday, October 27, 2000**

**<http://ideas.stsci.edu/>**

**NRA 00-OSS-02**  
**MINORITY UNIVERSITY**  
**EDUCATION AND RESEARCH**  
**PARTNERSHIP**  
**INITIATIVE IN SPACE SCIENCE**

A Joint Initiative of the  
Office of Space Science  
and  
Office of Equal Opportunity Programs  
National Aeronautics and Space Administration

# MINORITY UNIVERSITY INITIATIVE IN SPACE SCIENCE

- Motivated by recognition that critical steps must be taken to broaden the participation of underrepresented groups and minority institutions in NASA research programs and missions:
  - According to *NASA's 1996 Science Policy Guide*, “The economic vitality of our nation depends increasingly on new scientific knowledge and its application. For NASA, this means ensuring that the ideas and capabilities of the widest possible talent pool are brought to bear on its missions.”
  - Furthermore, to ensure that a continuing supply of scientists, engineers, and technologists will be available to meet the needs of the twenty-first century in the Space Science Enterprise, the *Space Science Enterprise Strategic Plan* “promotes the involvement of underserved/underutilized groups in Space Science education and outreach programs and their participation in Space Science research and development activities...”
- Developed through extensive visits, meetings, and discussions with representatives of minority institutions to ascertain the most effective strategies for achieving common goals.

# MINORITY UNIVERSITY INITIATIVE

## Goals

- Long-Term Goals
  - Enhance minority college (2-year and 4-year) and university participation in Space Science education and research programs.
  - Increase the understanding of science, technology, and the role of research in contemporary society by a broad and diverse segment of the American population.
- Near-Term Goals
  - The development of space science-related academic capabilities at minority colleges and universities and, working through those institutions, the development of space science-related education programs and materials aimed at many levels in the education system; and
  - The enhancement/development of the educational and research capabilities of faculty and students in space science-related fields through the establishment of partnerships and exchange programs in research and education with NASA-supported space science research groups at colleges and universities, NASA Centers, other federal laboratories, and industrial organizations throughout the country.

Establishing strong linkages among OSS, the space science research community, and minority institutions . . . is a key element in . . . realizing these goals.

# **MINORITY UNIVERSITY INITIATIVE**

## **Eligibility**

- Proposals must originate from a U.S. college or university designated by the Department of Education as a minority institution:
  - Historically Black College or University (HBCU)
  - Hispanic-Serving Institution (HSI) [>25% Hispanic enrollment]
  - Tribal College or University (TCU)
  - Other Minority University (OMU) [>50% combined minority enrollment]
- In addition, HBCU's, HSI's, TCU's, and OMU's that have received a total of \$1 million or more of funding support from NASA's Space Science Enterprise over the past three years are ineligible to participate.
- A portion (up to 25%) of the funds awarded to a minority institution may be spent at nonminority institutions to support the development of academic and research partnerships and exchange programs with such institutions.

# MINORITY UNIVERSITY INITIATIVE

## Selection Criteria

- Project Significance and Quality (30%) - A compelling argument that the project is actually worth doing; a carefully thought out approach and clear case for the project's intrinsic educational or scientific merit.
- Project Feasibility (30%) - The project can actually be done for the requested funds; the proposing team has the capability and experience to carry out the project; appropriate facilities or institutional capabilities are available; appropriate commitments have been obtained from potential partners.
- Prospects for Institutional Development (20%) - Contributions to improving the institution's capabilities to carry out space science-related educational or research programs. Long-term plans for academic and institutional development and prospects for sustainability.
- Adequacy of Management Approach (20%) - Clear responsibilities for each participant and clear lines of authority. Timelines and milestones clearly defined and outlined. The effort can be successfully carried through to completion on time and within budget.

NASA plans to deliberately select proposals of different scales with diverse approaches to implementing these concepts from different types of minority colleges and universities located in many regions of the country, and to evaluate the effectiveness of a broad range of approaches to meeting the goals of this announcement as a basis for possible follow-on activities.

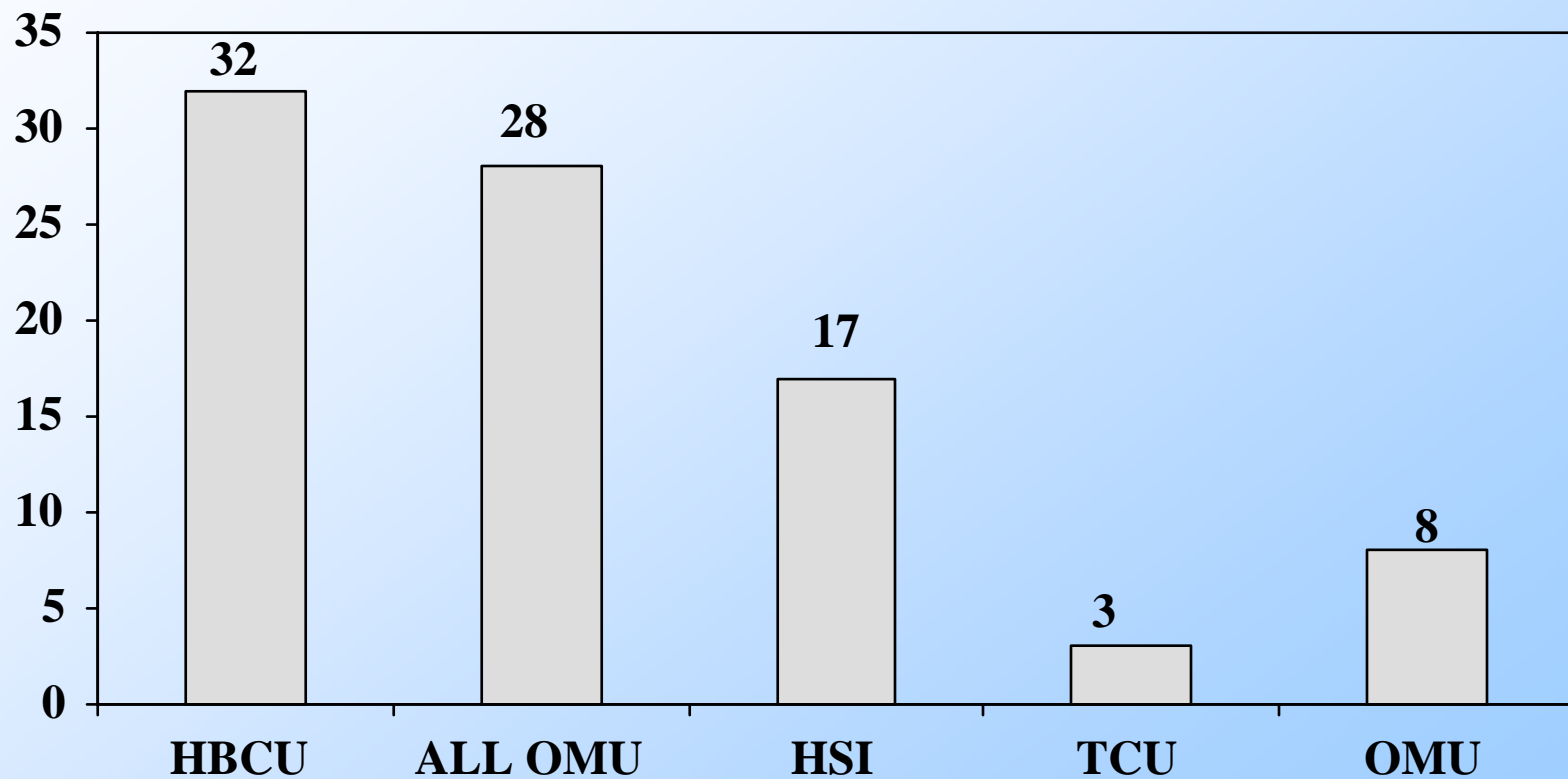
# MINORITY UNIVERSITY INITIATIVE

## Key Dates

- January 31, 2000 NRA Issued. Extensive distribution via OSS lists, OEOP lists, and MU-SPIN.
- Dear Colleague letter issued by OSS AA encouraging participation of all OSS researchers.
- Website for institutions seeking partners established.
- March 23-May 10 On-line pre-proposal conference
- March 31, 2000 Notices of Intent Due. 86 notices received.
- May 10, 2000 Proposals Due. 60 proposals received.
- May 11-31, 2000 Compliance checks. 50 proposals found compliant
- June 27-29, 2000 Review Panel convened in Washington, DC
- September 1, 2000 Selections
- January 1, 2001 Awards

# **MINORITY UNIVERSITY INITIATIVE**

## **60 Proposals Received**



# **MINORITY UNIVERSITY INITIATIVE**

## **Expertise of the 30 Reviewers**

- Minority Institution current/former administration/faculty (5)
  - HBCU (2)
  - HSI (2)
  - TCU (0)
  - OMU (1)
- Representatives of minority-serving organizations (2)
  - African American (1)
  - Native American (1)
- Minorities(13)
  - African American (8)
  - Hispanic (2)
  - Asian/Pacific Islander (3)
- Non-minority college/university faculty/staff (5)
- Professionals in K-12 formal education/education program managers (14)
  - NASA (4)
  - NSF (1)
  - External (9)
- Professional scientists (13)
  - NASA (2)
  - NSF (1)
  - External (10)

NOTE: Because of the extensive cross-expertise brought by the panelists, many of the 30 panelists are counted in more than one category.

# MINORITY UNIVERSITY INITIATIVE

## Proposals Selected for Funding

- Fifteen proposals could be selected within the available program funding:
  - HBCU's
    - Alabama A&M University (T. Arjun): New undergrad courses, degree, and research program. MSFC scientists help develop and teach courses and supervise student research.
    - Florida A&M University (C. Weatherford): Theoretical modeling of x-ray line formation, and new graduate course in atomic and molecular astrophysics.
    - Hampton University (S. Bailey): Expand space science base at Hampton Center for Atmospheric Sciences to encompass other Hampton faculty, education students, community colleges and high schools.
    - Norfolk State University (C. Salgado): nuclear and particle physics research with GSFC particle astrophysics missions, undergrad course/degree development, teacher training and public outreach.
    - South Carolina State University (D. Walter): Extensive multi-institutional research collaborations, addition of new astronomy faculty position, undergrad pipeline development, teacher training and K-12 outreach.
    - Southern University, Baton Rouge (G. Stacy): Bring Southern students and faculty into active participation in SOHO and in a Louisiana State gamma ray balloon project.

# MINORITY UNIVERSITY INITIATIVE

## Proposals Selected for Funding (continued)

### – HSI's

- Eastern New Mexico University at Portales (S. Nutter): Inter-weave faculty participation on cosmic ray balloon mission with undergrad student research, teacher training, and public outreach.
- University of Houston-Downtown (P. Morris-Smith): Close collaboration with JSC Earth Science and Solar System Division for student research, teacher training, and high school and public outreach.
- University of Texas at El Paso (R. Lopez): integration of Sun-Earth Connection content into undergraduate classes, high school outreach, and teacher training.

### – TCU's

- Salish Kootenai College (T. Olson): Develop four new courses in astronomy and astrophysics.
- Diné College (S. Semken): Use Internet to deliver space science education and research programs throughout a southwest consortium of colleges and universities.
- Southwest Indian Polytechnic Institute (C. Abeita): establish Meteorite Identification Lab at SIPI and use for undergrad research and high school Upward Bound program.

### – OMU's

- Medgar Evers College (L. Johnson): Coordinated development of space science courses/degrees at six CUNY campuses and creation of high school feeder programs.
- University of Hawaii at Hilo (R. Crowe): Partnership with Mauna Kea observatories for undergrad course development, faculty and student research, and K-12 outreach to Native Hawaiians.
- York College (M. Spergel): Link with JPL, Princeton, and Amer Mus of Nat History to establish student research and incorporate space science throughout undergrad curriculum and teacher training.

# **MINORITY UNIVERSITY INITIATIVE**

## **Characteristics of the Selected Proposals**

- **Broad diversity of institutions and settings:**
  - HBCU's (6), HSI's (3), TCU's (3), and OMU's (3)
  - Urban (New York City, Houston) and rural (New Mexico, Montana)
  - South (5), Southwest (4), Mid-Atlantic (2), Northeast (2), Northwest (1), and Hawaii (1)
- **Strong partners:**
  - NASA Centers and facilities (JPL, GSFC, JSC, MFSC, STScI, IRTF)
  - National laboratories and observatories (LANL, LLNL, KPNO, Gemini)
  - Science Centers (American Museum of Natural History, Houston Museum of Science, El Paso Science Museum)
  - Major Universities (Princeton, Univ of New Mexico, Univ of Colorado, Penn State, LSU, UC Berkeley, Case Western)
- **Variety of approaches, mostly contained within comprehensive programs encompassing one or more of the following elements:**
  - Undergraduate/graduate degree programs/course development (10)
  - Precollege outreach/teacher training (10)
  - Public Outreach (3)
  - Research capability development (12)